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**FOREIGN
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JPRS Report

Nuclear Developments

Nuclear Developments

JPRS-TND-88-015

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SOUTH AFRICA

Nuclear Plant Site Near Humansdorp Chosen

51000018 Cape Town *DIE BURGER* in Afrikaans
11 May 88 p 2

[Article by Our Bureau]

[Text] Paarl—A study team has selected a site for the construction of a nuclear power plant in East Cape Province and the Electrical Supply Commission will decide soon about further steps, the head of the study team, Otto Graupner, said yesterday.

DIE BURGER learned yesterday from a reliable source that the site is near Humansdorp.

Graupner confirmed that an area between Port Elizabeth and the Tsitsikamma River was selected as a suitable site for a nuclear power plant.

"We cannot reveal the site until the council has accepted our recommendation."

A nuclear power plant in the area will bring great benefits to the region, he said. The port at Port Elizabeth will have to be altered appropriately and many main roads will be improved.

Scientists at the University of Port Elizabeth and Rhodes University participated in the study project.

"We have been doing geological studies to find suitable sites since 1985. A large portion of the coastal area between Gansbaai and Agulhas turned out to be unsuitable, but there is a strip of about 30 km between Quoin Point and Gansbaai that we will be looking into further."

According to Graupner, it is unlikely that a nuclear power plant will be constructed in less than 12 years.

12593

Government To Conduct Inquiry Into Nuclear Waste Disposal

51200038 Vancouver *THE SUN* in English
14 Jun 88 p A6

[Text] Ottawa—The federal government will conduct a public inquiry into what to do with Canada's nuclear fuel waste, Energy Minister Marcel Masse announced Monday.

The announcement came shortly after New Democrat House leader Nelson Riis presented a private member's bill in the Commons calling for a moratorium on nuclear reactor construction, a two-year inquiry into nuclear issues and a public referendum on whether to lift the moratorium.

A Commons committee called in January for a moratorium on the construction of nuclear power plants until there is an acceptable method of disposing of high-level radioactive waste.

The nuclear waste inquiry will be conducted by the federal environmental assessment review office.

The inquiry panel will look at a broad range of topics, Masse said in a statement, including the social, economic and environmental implications of long-term waste management.

/06662

Windsor MP Calls Fermi Plant Mishaps 'Prelude to Disaster'

51200039 Windsor *THE WINDSOR STAR* in English
23 Jun 88 p A5

[Text] Ottawa—Citing a \$200,000 fine levied against the Fermi II nuclear plant this week for two safety violations, MP Howard McCurdy (NDP—Windsor-Walkerville) once again called for the plant's closure.

The continuing mishaps at Fermi "could prove a prelude to disaster," McCurdy wrote to External Affairs Minister Joe Clark on Wednesday.

McCurdy said the U.S. Nuclear Regulatory Commission (NRC) fined the Monroe, Mich., plant \$200,000 Tuesday for a containment-radiation monitoring system that would not operate automatically and for an air compressor that rendered safety systems inoperative when it was out of service.

"The usual \$50,000 fine per safety violation was doubled to penalize the plant for past poor performance," McCurdy wrote to Clark. "The most recent fine underscores, once again, the threat to the health and safety of Southwestern Ontario residents that Fermi II, in its present condition, represents."

He called on Clark to press the U.S. to close the Detroit Edison plant until a joint review of its operation is conducted by an independent international panel of experts.

Located across the western end of Lake Erie from Essex County, the Detroit Edison plant has been plagued by equipment failures and management and personnel problems.

"If this doesn't give a message of an extremely dangerous plant, I don't know what does," McCurdy said in an interview. "It's just one thing after another."

"What is building up is the kind of preliminary tremblings you get before an earthquake."

/06662

Nuclear-Powered Submarine Issue Discussed

Poll Results

51200034 Ottawa *THE OTTAWA CITIZEN* in English
26 May 88 p D19

[Article by Jonathan Manthorpe]

[Text] Nearly 60 per cent of Canadians disapprove of government plans to buy nuclear-powered submarines, says a poll conducted for an Ottawa think-tank.

The poll of 1,520 people across the country was taken for the Canadian Centre for Arms Control and Disarmament and shows only nine per cent of those questioned are strongly in favor of the submarine program.

"The main conclusion is that the Defence Department campaign (to promote the \$8-billion submarine program) has failed," said centre director John Lamb. "It is not clear what the reasons are, but it is clear that Canadians are not behind this program."

The centre paid \$1,500 to have a single question inserted in a wide-ranging poll conducted by Environics Research Group Ltd in the first half of May.

The poll gathered responses to the statement: "The federal government plans to buy a fleet of 10 or 12 nuclear-propelled submarines at a cost of at least \$8 billion."

It found 35 per cent of those polled strongly disapprove of the program while 24 per cent somewhat disapprove.

Twenty-three per cent marginally support the plans and only nine per cent are enthusiastic backers.

Consortium Proposal

51200034 Toronto *THE GLOBE AND MAIL* in
English 2 Jun 88 p B11

[Article by Ken Romain]

[Text] Senior Government officials are proposing the formation of a consortium, made up of a group of companies led by Atomic Energy of Canada Ltd, that would be responsible for the acquisition and supply of the nuclear propulsion system for the new attack submarine for the Canadian Forces.

Adoption of the proposal would mean a strong boost to a moribund Canadian nuclear industry—which is suffering from a lack of orders—and is viewed by industry officials as a major and exciting development.

The new group would also be responsible for the system's design to meet Canadian requirements.

The establishment of the "entity," in which Crown-owned AECL would be an owner, will be part of a recommendation to be made to ministers and to the Cabinet, which is to select the winning submarine entry by the end of June in the \$8-billion program for 10 to 12 nuclear-powered vessels.

The new group will have full authorization to acquire the nuclear propulsion system. Although it will operate in the manner of a consortium, it is being described only as an "entity" by officials until its status is established.

Several companies would be part of the group, including the suppliers of the pressurized water reactors to the two submarines in contention for the Canadian program, the British-built Trafalgar-class boat and the smaller French-built Rubis-Amethyste-class vessel. The largest and most powerful propulsion system is installed in the British submarine.

Government officials associated with the program said that under the memorandums of understanding signed with the British and French governments, no impediment has been placed in the way of building either nuclear reactor in Canada.

However, it is thought most likely that parts of the propulsion system would be contracted out for manufacture in Canada to meet a requirement for at least 65 per cent Canadian content in the submarine program.

"But we could build 100 per cent of that reactor if we so want to," an official said.

Under the proposal, the new group, not the prime contractor, which will build the submarines at a Canadian shipyard will become the repository for the transfer of sensitive nuclear technology to Canada.

AECL, with its long experience in Canadian nuclear power development, will play the lead role in the new arrangement. The overseas partner, depending on the winning entry, could be either Rolls-Royce & Associates Ltd of Britain, which makes the nuclear reactor for the British submarine, or Technicatome of France, builder of the Rubis-amethyste reactor. These companies will supply the nuclear technology in which enriched uranium will be the fuel.

Rolls-Royce & Associates was formed in 1959 to manage the procurement of a pressurized water reactor for the first British nuclear-powered submarine, built by Vickers Shipbuilding & Engineering Ltd, which is also the designer and builder of the Trafalgar class boat.

Technicatome is the French nuclear naval agency, and has developed a smaller pressurized reactor for the Rubis submarine that is built by Direction des Constructions Navales. Both are owned by the French Government.

Healey on Cost

51200034 Toronto *THE GLOBE AND MAIL* in
English 9 Jun 88 p A3

[Article by Paul Koring]

[Text] Ottawa—Only half of the \$8-billion earmarked to buy a fleet of nuclear-powered submarines will be spent on the vessels and the rest on infrastructure, Eldon Healey, assistant-deputy minister of defence, said yesterday.

At a specially-arranged press briefing, the Defence Department stuck to its guns on the \$8-billion estimate, widely criticized as unreasonably low.

Mr Healey, who is responsible for materiel, told journalists studies of the British and French costs have proved with "a high degree of confidence" the program can be kept within that estimate.

However, \$4-billion for the vessels is \$1-billion less than first estimated when Defence Minister Perrin Beatty's White Paper was published a year ago this week.

And it means the proposed fleet of between 10 and 12 vessels will have to be trimmed to eight if the British Trafalgar class submarine is chosen.

Using 1986 costs—on which the program is based—the sailaway price of a Trafalgar is 230-million pounds (\$471.5-million at the December, 1986, exchange rate of \$2.05 to the pound). Eight Trafalgars would then cost \$3.8-billion.

Meanwhile, SNA Canada Inc, offering the French Rubis-Amethyste class submarine, claims it can deliver a fleet of 12 for \$4-billion at \$333-million a vessel.

SNA also claims to have an independent study showing the total program cost of its vessels would be \$7.5-billion.

However, the French cost estimate has raised eyebrows, especially in view of Mr Healy's statement that Canadian estimates for a conventional submarine are only 10 per cent lower—\$300-million—than for the nuclear-powered Rubis-Amethyste.

Many independent analysts say, however, that the British submarine is larger, faster, quieter and more capable. It also has a proven record for operating under the Arctic ice while the French one would need modification.

Beatty on Cost

51200034 Toronto *THE GLOBE AND MAIL* in English 21 Jun 88 p A4

[Article by Susan Delacourt]

[Text] Ottawa—The \$8-billion price tag for nuclear-powered submarines in the Arctic would buy everything the fleet needs, including a communications system, Defense Minister Perrin Beatty said yesterday.

Rear-Admiral John Anderson, the head of the submarine acquisition team for the navy, was quoted in *THE GLOBE AND MAIL* yesterday as saying that the \$8-billion would not be enough to cover the cost of a communications system vital to the operation of the submarine fleet.

Mr Beatty, after a discussion yesterday with Admiral Anderson, told the House of Commons that this was not exactly correct.

At present, he said, Canada's existing submarines and the new nuclear subs have the ability to receive, but not to transmit, the very-low-frequency signals needed to communicate in high latitudes.

For transmission, Canada currently depends on its allies' networks.

If Canada chose to end this dependence and spend the \$100-million to \$200-million necessary for its own system, the money would come out of the \$8-billion set aside for the submarines, Mr Beatty said.

Outside the Commons, however, he added that this could mean trade-offs in other areas that he did not specify.

"The \$8-billion is the total budget," Mr Beatty said.

"It does not mean you have to spend every penny within the \$8-billion. It gives you some room for flexibility for trade-offs in terms of what options you'd like to have or which ones are essential."

Admiral Anderson had also been quoted as saying that the submarine budget did not include two key items that the navy wanted for the boats—a nuclear fuel facility and anti-ship missiles.

Mr Beatty said flatly yesterday that these were not included because Canada did not intend to buy them. Even though the navy may want these two features, he added, the submarines can function perfectly without them.

Canada will rely on allies to make fuel for the submarines, since it is an exercise that needs to be done only once every eight to 10 years, he said.

"We don't intend to fabricate the fuel in Canada at this point, although we're leaving ourselves open the option in the future if we were to choose to do so.... At the present time it's not cost-effective for us to develop the fabrication facilities in Canada."

As for the anti-ship missiles sought by the navy, Mr Beatty simply repeated his earlier assertions that they are not needed. The Mark 48 torpedoes to be bought for the new subs can be put into "anti-ship mode" and are actually more expensive than the other missiles, he told the Commons.

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Ontario Hydro To Set Up Permanent Office in Budapest

51200035 Toronto *THE GLOBE AND MAIL* in English 14 Jun 88 p B23

[Article by Robert Sheppard]

[Text] Ontario Hydro will open a permanent business office in Budapest later this year as a first step toward marketing its nuclear energy expertise in countries of the Soviet bloc.

The office in Hungary will be the Ontario utility's first commercial beachhead in Eastern Europe.

It will be set up in August to manage two contracts, underwritten by the World Bank, to instruct Hungarian utility officials in the use of computers for designing and operating nuclear power plants. It will also serve as a base from which Hydro engineers and managers can lecture occasionally at Budapest's new Industrial School of Business.

However, the Hydro executive who will be running the office, George Bereznai, said the real importance of the operation will be to sell Hydro's management expertise to the Soviet Union.

"We have already identified the Soviet Union as the biggest single market" for the sort of specialized technology that Hydro managers are now seeking to sell, said Mr Bereznai, a physicist who was born in Budapest. "And the Soviets seem more than happy to come to Budapest to work with us."

Ontario Hydro, through its New Business Ventures division, was asked recently to bid on a training project involving nuclear installations in the Soviet Union, Mr Bereznai noted.

Canada and the Soviet Union do not now have a nuclear co-operation agreement, however, so there would have to be more diplomatic manoeuvring before any contract could be signed.

As with Hungary, Ottawa appears willing to sign bilateral nuclear co-operation agreements on a case-by-case basis with Communist countries.

The proposed Budapest office represents an expansion of Hydro's New Business Ventures Operation.

The division was established four years ago to market the Crown Corporation's nuclear energy expertise and byproducts during a period when there is a hiatus in Ontario's own nuclear planning. It had revenue of \$46.3-million last year, about \$10-million of which came from consulting and training contracts in 19 countries around the world.

The two contracts with Hungary are worth about \$1.2-million each, and apart from a smaller consulting contract in China, they represent Hydro's first real economic foray into the Communist world.

Hungary has two nuclear power plants and is looking to build more. So far, it has stuck with light-water plants designed in the Soviet Union. These are substantially different from the heavy-water Candu reactor, which Ontario Hydro operates and which has been sold to Romania.

Mr Bereznai said his job is not to try to sell the Canadian-made Candu as such, but essentially to market some of its spinoff technology, particularly in the areas of computer design and safety operations, which have more universal application.

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Cost of Darlington Nuclear Station Construction Rising

51200036 Windsor *THE WINDSOR STAR in English* 19 May 88 p A8

[Text] Toronto (CP)—The Darlington nuclear station, Ontario's largest construction project, is currently \$528 million over budget and five months behind schedule, estimates from Ontario Hydro show.

Construction costs have now climbed to a projected \$8.8 billion for the entire project, six per cent higher than what was estimated only a year ago, Hydro documents obtained under the Freedom of Information Act show.

That new total will make the cost of power produced at the four-unit station—at \$2,507 a kilowatt—five per cent more expensive than was previously thought.

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High Radiation Level Reported at Cigar Lake Uranium Mine

51200037 Toronto *THE GLOBE AND MAIL in English* 15 Jun 88 p B17

[Article by Geoffrey York]

[Excerpt] Winnipeg—High levels of radiation at the Cigar Lake uranium mine in northern Saskatchewan will prevent miners from working in direct contact with the underground ore, a nuclear energy conference has been told.

George Peebles, general manager of Cigar Lake Mining Corp, said the exceptionally high grade of uranium at Cigar Lake will force the corporation to adopt unconventional mining methods in which the equipment is controlled from remote locations.

The uranium deposits at Cigar Lake are 100 times richer than the deposits at older uranium mines in Ontario, where workers can spend a full shift in direct contact with the uranium, Mr Peebles said.

Because the deposits are so rich, workers cannot be exposed to the gamma radiation and radon gas for more than a few hours at a time, Mr Peebles said.

He said the mining corporation is likely to use the "raise-boring" method, in which a drill is located in a tunnel above the ore zone. A vertical hole is then drilled through the ore.

Under this method, several metres of rock will separate the drill operator from the uranium.

The method is commonly used in hard-rock mining, but it has never been required in uranium mining, Mr Peebles said in an interview.

In addition, the corporation will have to use extensive ventilation to get rid of the radon gas in the mine, he said.

Moreover, because of ground stability problems at Cigar Lake the corporation will find it difficult to use conventional drilling and blasting techniques, Mr Peebles said. Special ground-support measures will be needed.

Finally, the corporation will have to take precautions to deal with groundwater in the area. If the flow is not restricted, the mine would receive 2,000 cubic metres of water an hour, Mr Peebles said.

The Cigar Lake mine is the largest high-grade uranium deposit in the world. It contains an estimated 150,000 metric tons of uranium, mostly in ore with an average grade of 12 per cent uranium.

The corporation will begin sinking a 510-metre test shaft in mid-July. The mining test is expected to be completed by 1990, and then a feasibility study and environmental assessment will be conducted.

If the mine is approved, full production would begin in 1993 or early 1994, Mr Peebles said.

The uranium deposits are so rich that the mine can produce 5.5 million kilograms of uranium annually from slightly more than 90 tons of ore excavated each day, he said. Saskatchewan Mining Development corp owns 40.8 per cent of Cigar Lake Mining Corp, while a further 36.4 per cent is owned by Cogema Canada Ltd and a subsidiary, Corona Grade. Idemitsu Uranium Exploration Canada Ltd owns 12.9 per cent and Korea Electric Power Corp owns 2 per cent.

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Nuclear Power, Weapons Development To Continue

HK2207123888 Beijing ZHONGGUO XINWEN SHE
in Chinese 0317 GMT 20 Jul 88

[Text] Beijing, 20 Jul (ZHONGGUO XINWEN SHE)—In an interview with ZHONGGUO XINWEN SHE reporters, Jiang Xinxiong, general manager of the China Nuclear Industry Corporation, said that China's nuclear industry has taken off. In the years ahead, we will master the technology of nuclear power mainly through the practice of construction and lay a solid foundation for its development after the year 2000.

In the structural reform of the State Council introduced this year, the Ministry of Nuclear Industry has been changed to the China Nuclear Industry Corporation. Former Minister Jiang Xinxiong is now general manager of the corporation.

Jiang estimated that the installed capacity of China's nuclear power would reach 4.5 million to 6.7 million kilowatts by the end of the century. This implies that apart from the 300,000-kilowatt Qinshan Nuclear Power Plant and the 1.8 million-kilowatt Daya Bay Nuclear Power Plant, both of which are under construction, the installed capacity of new nuclear power plants will increase by 100 to 200 percent.

Jiang disclosed that two power plants, which each have a 600,000-kilowatt generating unit, will be built in the second-phase project of the Qinshan Nuclear Power Plant. The project is put on the record of the State Planning Commission and preparatory work is now under way. Two more power plants, each with a 600,000-kilowatt generating unit, will probably be built in the future.

In view of China's current financial capacity, Jiang Xinxiong believed that the position of nuclear power will still remain behind thermal and hydropower in China's energy distribution in the near future. Its position will not change. Because of China's energy shortages, imbalance of regional distribution, and environmental pollution, however, the policy of developing nuclear power will remain unchanged. There will be no way out for the Changjiang and Zhujiang valleys and the economically developed areas along the coast unless they develop nuclear power.

The construction progress of the two nuclear power plants is smooth. The major construction projects of Qinshan Nuclear Power Plant including the factories for the reactor and generator are near completion. The equipment purchased from FRG and Japan, which arrived on schedule, will be installed starting this quarter.

The construction of the main project of the Daya Bay Nuclear Power Plant has started on schedule. The missing reinforcing bars incident which took place last year has been appropriately settled. The delay can be made up this year.

China's top leaders are deeply concerned about the construction progress and quality of the nuclear power plants. Since the beginning of the year, Zhao Ziyang and Li Peng have personally gone to Daya Bay to inspect construction of the nuclear power plant.

According to the progress, it is estimated that the Qinshan and Daya Bay Nuclear Power Plants will be completed and put into operation in 1990 and 1992, respectively. Information from various localities indicates that Jiangsu, Fujian, Jiangxi, Hunan, Jilin, and Hainan also intend to build nuclear power plants.

Following the shift from a ministry to a corporation, General Manager Jiang Xinxiong said that the main tasks of China's nuclear industry are to continue to vigorously develop nuclear weapons and nuclear power, and develop economic and technological cooperation and exchanges in the sphere of nuclear energy with all friendly countries. The work of forming the corporation is nearly complete. Following its establishment, the corporation will cut down five functional departments and reduce its staff from more than 900 to 590.

Nuclear Industry To Develop Civilian Products

OW2307142588 Beijing XINHUA in English
1208 GMT 23 Jul 88

[Text] Beijing, July 23 (XINHUA)—China's Nuclear Industry Corporation today set up a new company to develop more products for civilian use.

The Baoyuan Development Company will help enterprises upgrade technology and raise funds and will also provide production and market information and assistance in conducting cooperatives with foreign firms or absorbing foreign capital.

China's nuclear industry began in 1978 to shift its exclusive military production to civilian-use products.

The output of civilian-use products reached 440 million yuan in 1987, about one-third of the total of the industry.

HONG KONG

PRC Will Allow Locals To Sit On Daya Bay Advisory Board

51400013 Hong Kong *SOUTH CHINA MORNING POST* in English 14 Jun 88 p 3

[Article by Andy Ho]

[Text] Beijing will invite overseas Chinese scientists, Hongkong legislators and other locals to sit with mainland officials on a Daya Bay advisory panel.

The move is aimed at increasing local confidence in the safety of the nuclear plant which is being built 50 kilometres from Hongkong. It also represents a softening of China's stance of two years that no Hongkong people be included on the body.

Chinese nuclear authorities have agreed in principle to set up a Sino-Hongkong Daya Bay consultative committee which will be modelled on the Hongkong Government's existing advisory bodies, sources said yesterday.

Like many Government-appointed advisory boards, the proposed panel would include a mixture of expert and lay members.

In a bid to show it is concerned about local doubts over the nuclear plant, both Hongkong residents and overseas Chinese nuclear experts will be invited to sit on the body.

Besides Legislative Councillors, radiological experts and nuclear scientists, public relations specialists will be short-listed for membership.

The inclusion of public relations experts is aimed at countering the bad publicity the project has encountered since the Guangdong Nuclear Power Joint Venture Company was formed to oversee the mammoth \$28.8 billion Daya Bay nuclear investment.

Doubts about the project grew last September when it was revealed that more than half of the 576 "starter" reinforcement bars were missing from the foundation raft of the reactor complex.

"The Chinese authorities have recognised their deficiencies in handling the Hongkong media and accept that they need some expert advice," a source said.

Despite repeated assurances about maintaining high safety standards, the Chinese were said to have been embarrassed that the project had gone wrong at a relatively early and simple civil engineering stage.

"It is the Chinese authorities' intention to give the committee a free hand to delve into the files and documents of the nuclear joint venture as far as possible," the sources said.

The committee will occasionally release information on project developments.

Members will be given initial two to three-year terms of office. Most of the original members are expected to be re-appointed for a second term unless the committee turns out to be less effective than anticipated.

The committee's proposed membership and terms of reference are the result of careful and prolonged consultations between the two governments, conducted through the local branch of the New China News Agency.

The legislators most likely to be asked to join the committee are Mr Wong Poyan, head of the Legco ad hoc group on Daya Bay and a Basic Law drafter; Professor Poon Chung-kwong, chairman of the Committee on Science and Technology; and Mr Cheng Hon-kwan, representing the engineering constituency in the legislature.

A proposal to set up the Sino-Hongkong joint consultative committee on the Daya Bay project was first put forward to then vice-premier Li Peng two years ago by Legco members during a fact-finding trip to Beijing.

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Daya Bay Nuclear Power Plant Construction on Target

51500014 Hong Kong *SOUTH CHINA MORNING POST* in English 24 Jun 88 p 2

[Article by Andy Ho: "Daya Bay Plant Catching Up With Schedule"]

[Text] Construction of the Daya Bay nuclear power plant is expected to be back on schedule by the end of the year despite the recent strike and construction faults.

Plant officials yesterday told a Legislative Council working group that the \$28.8 billion project was about a month behind schedule because of the construction faults discovered in September.

The managing director of the Hongkong Nuclear Investment Company (HKNIC), Sir Jack Cater, said that time lost because of the delay in correcting the faults had gradually been recovered and structural work would be completed well within contract dates.

The HKNIC, which holds a 25 percent stake in the Daya Bay investment, was presenting its first progress report on the scheme to the councillors since November.

The two 900 megawatt Daya Bay reactors are scheduled to come on stream by October 1992 and July 1993. Culverts for the Unit 1 turbine building have been completed and hydro tests are under way.

Sir Jack told reporters that contract work, staff recruitment and training programs for operational personnel were all on schedule.

Assembly welding is being carried out by Framatome in France for the major Daya Bay nuclear facilities, including the reactor pressure vessels and pressurisers.

The General Electric Company of Britain is producing the steam turbines generators, major pipeworks and pumps for the project.

"A total of 165 staff who will occupy key positions in the operational department have already been taken on. Their general education level is that of bachelor degree with about 20 holding master's degrees," Sir Jack said.

The Guangdong Nuclear Power Joint Venture Company (GNPJVC)—the umbrella group for developing the Daya Bay project—has 900 employees. Of them, 110 were recruited from outside China.

"Forty of the key staff have more than 3 years experience in designing nuclear research reactors or in their operation. Another 40 have more than 3 years' experience in the operation of conventional power plants. Sir Jack said.

These staff will go through different training programs, including language proficiency. They will be trained for an average of 3 to 4 years in both China and France.

Construction of an on-site training centre is under way and two simulators for training purposes will be installed later this year and by early 1992.

Various supervisory teams have also been significantly strengthened after 316 reinforcement bars were found missing from the foundation raft of the reactor complex.

The Campenon Bernard-led HCCM group—the contractor responsible for the construction blunder—has increased the number of its French senior supervisors from seven to nine.

The staff of the quality assurance team has also been expanded from 4 to 11, while the general foreman to worker ratio has been reduced from 1 to 10 last year to the present level of 1 to 6.7.

The GNPJVC has also signed a contract with French companies Framatome and Spie Batignolles for the construction on site of nuclear equipment. The main part of this work will start next year.

The company also granted a contract on marine civil works to the Chinese Fourth Harbour Company.

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BRAZIL

Debts, Delays Mark 13 Years of Nuclear Accord With FRG

Nuclear Program Severely Criticized

51002028 Sao Paulo FOLHA DE SAO PAULO in Portuguese 27 Jun 88 p A-6

[Article by Tania Malheiros]

[Text] With debts amounting to \$4 billion (about Cz\$700 billion at the official exchange rate) and far behind on its timetable, the government establishment called NUCLEBRAS [Brazilian Nuclear Corporations, Inc.] does not have many reasons for commemorating today the signing, 13 years ago, of the nuclear agreement between Brazil and Germany which in effect created it during the administration of Gen Ernesto Geisel (1974-1979). Expected to go into operation 8 years ago, the Angra 2 plant, in the township of Angra dos Reis (151 km from Rio, along the southern shore of the state), had its opening postponed to the year 1992. Angra 3 was to be opened in 1992 but that date was moved to 1995. In addition to these problems, the government's nuclear program was further beset by the development of the parallel program pursued by the Armed Forces to which the administration gave priority over the past 7 years.

CNEN (National Nuclear Energy Commission) President Rex Nazareth, 51, for the first time admitted the existence of the parallel nuclear program about a year and a half ago, after FOLHA detected the existence of an Air Force proving ground in the Cachimbo Mountain Range in the southern part of Para. At that time, Rex said that the parallel program was coordinated by him. In December 1986, FOLHA noted the existence of four secret bank accounts, called "Deltas," kept in the name of CNEN officials, through which funds earmarked for the parallel program were being channelled.

Today, a commission coordinated by the CSN (National Security Council) is trying to find out where the government program is headed and is not ruling out the possibility of tying it in with the parallel program which is also supervised by CNEN. The decision on this study was published in DIARIO OFICIAL of 17 May and the commission had 45 days from that date to submit its final report. Independently of the commission's suggestions, NUCLEBRAS will, by this coming 30 [June], receive the proposals of four syndicates of companies from which it can pick those that will install the electro-mechanical portion of Angra 2, starting in 1989.

Plant Will Be 20 Years Old

Initially, the nuclear agreement between Brazil and Germany called for the construction of eight plants. In February 1980, for example, this requirement was

defended by the NUCLEBRAS president for 1975-1983, Paulo Nogueira Batista (currently Brazil's ambassador to the UN) and by CNEN President Rex Nazareth.

If it were to be opened in 1992, as planned, Angra 2 will have taken 20 years to be built. Angra 2 was absorbed into the agreement between Brazil and Germany but its foundation work, such as the placement of pilings, had begun in 1972; this job was done by the state-run enterprise Furnas Centrais Eletricas which, at the same time and in the same place, began work on Angra 1, purchased by the United States company Westinghouse Electric Corporation that has nothing to do with the agreement with Germany. According to Furnas, Angra 1 cost \$1.8 billion (about Cz\$324 billion at the official exchange rate). Angra 1 was opened in January 1985 and ran into countless problems, including a short-circuit in the electric generator which paralyzed installation work a year ago. Furnas expects that Angra 1 will again be operational this coming September or October.

From the start of construction work on Angra 2—between 1976 and 1977—until last year, NUCLEBRAS spent \$1.5 billion (about Cz\$261 billion) on civil engineering work, in the form of payments to contractors and equipment purchases according to the enterprise's president Licinio Seabra. The civil engineering work on Angra 2 is finished but nothing has been installed as yet. With this unit, NUCLEBRAS will have to pay another \$1.2 billion (about Cz\$209 billion) to fulfill the contracts that were signed.

The Angra 3 plant—which today is nothing but a big hole in the ground—between 1984 and 1987 consumed \$568 million (Cz\$99 billion, approximately) for equipment and civil engineering work which was confined to the foundation whereas another \$1.5 billion are committed and will have to be paid, according to Licinio.

Imported equipment—equivalent to \$150 million (Cz\$26.1 billion) for Angra 2 and another \$200 million (Cz\$34.8 billion) for Angra 3—is still stored in Hamburg, Germany. NUCLEBRAS did not announce how much it has paid so far and how much it is still paying for the items stored there. Also imported from Germany but stored in Rio are equipment items purchased for the amount of \$480 million (Cz\$83.5 billion) for Angra 2 and \$370 million (Cz\$64.4 billion) for Angra 3.

Ueki Says That He Would Sign Agreement All Over Again

Shigeaki Ueki, minister of mining and energy between 1974 and 1979, told FOLHA that "without any doubt" he would again sign the nuclear agreement between Brazil and Germany today. The former minister did not want to comment on the parallel program and said that, as he saw it, the thing that harmed the government's program was "the vagueness of the administration." For Ueki, the agreement brought benefits to the country with the "discovery of new reserves of uranium and the

advanced training of professional personnel to work in the nuclear field." The president at that time, Gen Ernesto Geisel, did not want to talk about this matter.

Brazilian physicist Jose Leite Lopes, who today lives in France, said by telephone that "the agreement was not good for Brazil, either for the military administration or the New Republic." In his opinion, "Brazil lacks competent people with a determination to lead the country forward." Leite Lopes said that the fact that Brazil managed to enrich uranium—at the Aramar Experimental Center of the Navy Ministry in Ipero (Sao Paulo)—"was a big gain but you have to know what to do with that knowledge."

NUCLEBRAS President Licinio Seabra said that the program should be continued "with corrections of direction and objectives," which, according to him, were diagnosed about 2 years ago by a commission appointed by President Jose Sarney. For Licinio, "the program is important for the country's energy development, if it were adjusted to the actual current situation, a situation very different from that at the time of its signing." Concerning the benefits deriving from the agreement, he mentioned the procurement of "material and technological stuff and skilled manpower."

Four Consortia Competing for Angra 2

The four consortia that were prequalified by NUCLEBRAS to participate in the competitive bidding for the electromechanical installation work on the Angra 2 plant are as follows: (1) Tenenge-Tecnica Nacional de Engenharia, Montreal Engenharia S.A., Ebe-Empresa Brasileira Engenharia S.A.; (2) Construtora Mendes Junior S.A., Sade-Sul Americana de Engenharia S.A.; (3) Techint-Companhia Tecnica Nacional, Ultratec Engenharia S.A., Enesa Engenharia S.A.; (4) Construtora Andrade Gutierrez S.A., Sertep S.A. Engenharia e Montagem and A. Araujo S.A.-Engenharia e Montagem.

Contract signing with the winning consortium is scheduled for next December. NUCLEBRAS estimates that the assembly work can be done within 5 years. In the mechanical part alone, 3,500 components and 170,000 meters of conduits will be installed. Today, 80 civil engineering and construction enterprises remain linked to the undertaking which comprises 1,500 employees.

Nuclear Power Plant Construction Timetable

Plant: Angra 2—start of work: 1972; initial estimated date of operation: 1980; current estimated date of operation: 1992.

Angra 3—start of work: 1984; initial estimated date of operation: 1992; current estimated date of operation: 1995.

The Angra 1 plant is not part of the agreement between Brazil and Germany; it was built by Westinghouse, of the United States. Construction work began in 1972 and completion was originally scheduled for 1980. It was completed and became operational in 1985.

Chronology of Nuclear Energy in Brazil

1945: Brazil agreed to export about 3,000 tons of monazitic sand to the United States over a period of 3 years. This was the first nuclear agreement between the two countries. From monazite it is possible to extract rare earths and thorium (radioactive elements).

1952: Brazil and the United States signed the second accord. This time, Brazil pledged to sell 2,500 tons of monazitic sand per year for a period of 3 years.

1954: Signing of the third accord between Brazil and the United States. Brazil was to export 5,000 tons of monazitic sand over a period of 2 years. In exchange, it was to get 100,000 tons of wheat. This became known as the "wheat accord."

Adm Alvaro Alberto purchased three ultracentrifuges from Germany but delivery was vetoed by the United States. Uranium can be enriched by means of ultracentrifuges.

1956: Establishment of the CNEN.

1972: Agreement with the United States for the construction of Angra 1.

1975: Agreement with Germany.

1986: Navy Minister Adm Henrique Saboia admits the existence of studies for construction of a nuclear submarine.

Discovery of the underground installation at the Cachimbo Range proving grounds in the southern part of Para, belonging to the Ministry of Aeronautics.

1987: President Jose Sarney announces that Brazil possesses the technology for uranium enrichment.

Accident involving Cesium-137 (a radioactive material) in Goiania (Goias), causing the death of four persons.

1988: Administration opens Aramar Experimental Center of the Navy in Ipero (SP) where uranium is being enriched.

Nuclear Adventure

51002028 Sao Paulo FOLHA DE SAO PAULO in Portuguese 28 Jun 88 p A-2

[Editorial]

[Text] Just 13 years after the signing of the agreement with West Germany, the development of the Brazilian nuclear program continues to be marked by the disrepute that characterized its beginning. In the light of the report published yesterday by FOLHA, there is no reason to commemorate that anniversary; until now, the bottom line of the nation's investment in the atomic field adds up to a debt amounting to \$4 billion, some accidents, ecological threats, unfinished work, delay in meeting deadlines, and an unacceptable lack of openness on the part of the administration.

Completed in 1985, Angra 1 is now inoperative because of a succession of technical problems. The opening of Angra 2 was postponed until 1992 and Angra 3 is nothing but a big hole in the ground. But more than the failure and lack of competence displayed in the handling of these projects are behind the population's lack of confidence. The existence of a "parallel" nuclear program—carried out beyond public control, sustained by funds coming from secret bank accounts—and the news that the construction of another four plants is being contemplated by responsible agencies constitute sufficient grounds for greater apprehension.

Obviously, we do not want to deny the importance of mastering atomic technology. But this goal must be achieved in line with Brazil's real possibilities. As a matter of fact, the country has an as yet unexploited water power potential, capable of contributing to meeting the most urgent energy requirements; and the government could, at the same time, develop a nuclear program on the basis of a reasonable, progressive, and open timetable.

The truth is that, throughout the past 13 years, we have had an accumulation of mistakes, disregard of rules, and waste. It would be deplorable if this sort of thing were to go on, in spite of everything that happened. The anniversary of the agreement between Brazil and Germany only serves as a warning to the authorities in terms of at last putting an end to the Brazilian nuclear adventure.

Seabra Defends Accord

51002028 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 25 Jun 88 p 31

[Text] NUCLEBRAS President Licinio Seabra said yesterday that "The agreement on cooperation in the field of the peaceful use of nuclear energy, signed between Brazil and Germany 13 years ago, was a decision made by the administration with a view to enabling the country to enter the nuclear age; it was motivated by the need for adopting a policy of self-sufficiency in the field of energy. Today, the results can be seen by the absorption and progressive development demanded by this high technology which practically spreads throughout all branches of modern technology."

Licinio Seabra emphasized that the important thing here is to stress the political and strategic aspects that guided the Brazilian Nuclear Program; these include the desire to guarantee available energy in medium-range terms through the implementation of a nuclear program specifically geared toward the production of electric power.

The NUCLEBRAS president summarized the success achieved by virtue of the agreement with Germany, covering the establishment of Brazilian nuclear enterprises under the NUCLEBRAS systems, especially NUCLEN [NUCLEBRAS Engineering, Inc.], NUCLEP [NUCLEBRAS Heavy Equipment, Inc.], NUCLEI [NUCLEBRAS Isotope Enrichment, Inc.], and factories turning out fuel elements as well as separation plants.

05058

BANGLADESH

Rooppur Nuclear Plant To Be Joint Venture Project

51500205 Dhaka *THE BANGLADESH OBSERVER* in English 9 Jun 88 p 8

[Text] The proposed 320-megawatt Rooppur Nuclear Power Plant will be a joint venture undertaking with participation of Bangladesh Government and expatriate investors, reports BSS.

This was approved at the third meeting of the Rooppur Nuclear Power Plant implementation committee held Wednesday morning at the President's Secretariat with President Hussain Muhammad Ershad in the chair.

The meeting took stock of progress in the implementation of the project and also reviewed the advancement attained in the framing of the feasibility report.

It expressed satisfaction at the pace of progress achieved in the way of implementation of the prestigious power project with most advanced technology.

Finance Minister M. A. Munim, Planning Minister A. K. Khandoker, Energy Minister A. B. M. Golam Mustafa, Principal Secretary to the President A. H. F. K. Sadeq, Chairman, Atomic Energy Commission Dr. Anwar Hossain and concerned officials were present in the morning.

The meeting was apprised that the draft final feasibility report on the Rooppur Project will be ready by July next while the final report will be available with the Government by September, 1988.

It was also informed of consultants recommendations to go ahead with the project.

President Ershad asked the concerned authority to start firming up the finance for the Rooppur Project including suppliers, credit, soft loan and equity participation. Expressing firm political determination of his Government to implement the Rooppur Nuclear power station near Paksey in Pabna district, the President said it will not only enable us to exploit the benefits of modern scientific advancements as a source of cheap power, but also help conserve our valuable gas resources.

The Rooppur nuclear power station was first planned long back in 1961 to have a generation capacity of 50 megawatt. But nothing tangible was done by consecutive governments after that.

However, a large area was requisitioned at Rooppur, four miles off Paksey town in Pabna, as the project site and some office and residential buildings sprang up there.

Last year, after taking up the implementation of the Jamuna bridge project, President Ershad gave political decision with firm determination to go ahead with the implementation of the Rooppur Project.

He also constituted a high-level implementation committee headed by himself for the purpose.

Since then two meetings of the committee were held and the third was held on Wednesday.

Wednesday's meeting decided that immediately after getting the final feasibility report, a high-power committee be formed with the Energy Minister at the head to firm up the finance for the implementation of the project.

/08309

INDIA

Gandhi: India Has No Plan To Build Nuclear Weapons

51500200 Calcutta *THE STATESMAN* in English 6 Jun 88 p 9

[Excerpt] New Delhi, 5 June—India does not plan to build its own nuclear weapons and has no interest in becoming a "superpower" in South Asia, the prime minister, Mr Rajiv Gandhi, has said, reports UNI.

Before his departure on a tour of four nations, including West Germany, Mr Gandhi also called for a "better concept" to stop the worldwide arms race and stressed the potential for boosting bilateral economic and political links with Bonn.

He said, "we do not intend making nuclear weapons. And we will hold ourselves back from developing a nuclear weapon. But the fact is that if Pakistan does have a nuclear weapon, it is going to cause very severe problems for us."

"Pakistan having a nuclear weapon is not quite the same as some other country having a nuclear weapon. We have lived with the Chinese nuclear bomb and not developed our own weapon for many years now. So it is not that we can't live with a nuclear neighbour," Mr Gandhi added.

He said India had no ambitions to assume the role of a South Asian "superpower," adding that the country had now firmly established its place in the world political scene.

"India does not have such aspirations. Certainly not in a military sense. If you say, 'does India want to be influential in new ideas and thinking and giving direction?' Yes, of course, we want to be. But we do not see ourselves as militarily expansionist," Mr Gandhi said.

Mr Gandhi said Pakistan's whole nuclear programme had been "smuggled and stolen from other countries," including West Germany.

"We don't want to spend so much on defence. We feel that most of these expenses on defence are a waste. But we are forced to do it mainly because of the military assistance that Pakistan gets," Mr Gandhi said.

Speaking on disarmament, Mr Gandhi said, "there must be a better concept developed. I do not think we can be presumptuous enough to propose such a concept, but we would like a debate to start on these ideas."

He said there was a basic difference between the way Europe and India conceived disarmament. "We feel that deterrence is not adequate in the 20th and 21st centuries. What is called deterrence is only leading to an increased arms race."

"We worry about Europe, because we fear a nuclear war is not going to be limited to the region. So, if Europe is tense, it's equally dangerous for us," he explained.

/12232

Expectations From Gorbachev November Visit Told

46001540 Calcutta THE TELEGRAPH in English
14 Jun 88 p 1

[Article by K. K. Sharma]

[Text] New Delhi, June 13—The Soviet leader, Mr Mikhail Gorbachev, is to visit India again in November, his second visit in two years. At least two major agreements are to be signed while he is here to further promote Indo-Soviet economic relations.

The first is an agreement on Soviet assistance to establish two giant nuclear power stations in south India, each of which will be of the size of 1,000 MW. The second is an agreement for a new line of credit of 300 million roubles for the private sector so that Indian businessmen can import Soviet machinery.

Both agreements are highly significant since they will take cooperation between the two countries to new areas. The Soviet offer to build nuclear power projects has finally been accepted despite opposition by the Atomic Energy Commission, which feels India has the ability to establish its own nuclear generation plants.

The Soviet offer for building nuclear power stations is at least 10 years old and was repeated by Mr Gorbachev when he visited India two years ago. Because of objections by the Atomic Energy Commission, the offer was stalled particularly when the Chernobyl disaster cast doubts about the safety of Soviet-designed plants.

The original offer by the Soviet Union was for a single nuclear power station of 500 MW. Far from being rejected, as seemed likely until recently, the government has now decided to give the Soviet Union contracts for two plants, each of which will be twice this size. Both will be located at sites to feed to southern power grid.

A number of factors have gone into the decision to accept the Soviet offer, including the desire of the two countries to accelerate economic cooperation and boost their bilateral trade two-and-a-half times to reach a two-way turnover of Rs 10,000 crores by 1992. The Soviet plants will also help achieve the target of setting up 10,000 MW nuclear generation capacity by 2000 AD.

But the clinching factors were the terms offered by the Soviets to set up the nuclear plants and their agreement not to press for safeguards on all Indian nuclear installations as required under international agreements. The plants are to be set up on a turnkey basis, but substantial Indian components will be used.

The financing terms are so favourable—including long repayment periods and low interest rates—that the Soviets will effectively bear half the cost of the plants. This is important at a time when India is facing a serious shortage of funds for development projects.

The other major agreement to be signed during Mr Gorbachev's visit is for a 300-million rouble line of credit to be routed through the Industrial Development Bank of India (IDBI) for the private sector. The Soviet Union has recently opened its economy to private businessmen and is keen also that Indian industrialists buy as much as possible from Soviet engineering undertakings. This line of credit will make this easier.

/9274

India Asks Halt in Recycling of Nuclear Materials

51500207 Calcutta THE STATESMAN in English
21 Jun 88 p 5

[Text] UN Headquarters June 20—India has proposed that the Soviet Union and the USA should not recycle into other nuclear weapons the fissile material which will be released when they destroy nuclear missiles under the INF treaty, reports PTI.

The treaty, ratified at the Moscow summit last month, has left open the question of disposal of some 2,000 nuclear warheads on intermediate and shorter-range missiles that are to be destroyed. They are free to do anything with fissile material contained in the warheads, including the option of recycling them into new warheads for use in other missiles not covered by the treaty.

In a proposal submitted to the current special disarmament session of the U.N. General Assembly, India says that the two superpowers be urged not to recycle the

fissile material into other nuclear weapons and to place it under the supervision of the International Atomic Energy Agency, while keeping it in their physical custody.

India's note estimates that the minimum amount of fissile material that warheads released under the INF treaty would be 10 to 20 tons in case they are plutonium devices, and about two to three times that amount if they are enriched uranium devices.

The obvious way of utilizing plutonium or enriched uranium for peaceful purposes is to feed it into a fast breeder or power reactor for generating energy. The amounts of plutonium or uranium to be released by the INF treaty could provide fuel for generation of about 1,000 megawatts of power, it says.

While describing this amount of power as rather trivial, India states that "the entire question has to be considered on the basis of the assumption that the INF treaty would be a true disarmament measure and that what is involved is not only the release of 10 to 20 tons of plutonium" but a much bigger amount that will be available in the event of total nuclear disarmament.

India, which conducted a peaceful nuclear explosion in 1974, also states in its document that one of the options for use of the fissile material is to utilize it in such explosions. "The full potential of peaceful nuclear explosions is yet to be explored and there is a strong case for doing so, particularly when surplus fissile material may be available," it says.

Another option mentioned by India is to use enriched uranium after suitable dilution for nuclear-propelled submarines and high-temperature gas-cooled reactors.

Calling for a halt to the further production of weapon-grade fissile material, India also urges that there should be a freeze on making more nuclear weapons.

/6091

Safety of Indian Nuclear Power Plants Stressed

51500199 Madras *THE HINDU* in English
7 Jun 88 p 3

[Text] Madras, 6 June—Eminent scientists of the Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam, and Madras Atomic Power Station today called for proper education of the public to promote acceptability of nuclear plants. The successful operation of over 400 nuclear plants in the world—barring accidents at Chernobyl in the USSR and the Three-Mile Island in the United States—demonstrated the safety of nuclear reactors, they said.

Mr C. V. Sundaram, director, IGCAR, said it had been realised that most of the nuclear reactor designs were proven and the accidents in reactors at Chernobyl and

Three-Mile Island were caused by operators' failures. Hence, to allay public fear, it was necessary to introduce emergency preparedness in every nuclear programme, however unlikely a nuclear reactor accident might be. The MAPS' authorities at Kalpakkam had organised such programmes and also conducted drills for such an emergency.

Mr Sundaram was participating in a discussion on the "The lessons of Chernobyl: safety of the Soviet atomic power engineering," to mark the International Environment Protection Day. The discussion was organised by the Soviet Cultural Centre, Madras.

N-power generation low: While nuclear power accounted for 70 percent of the total electricity generated in France, 50 percent in Sweden and 25 percent in Japan, it accounted for only 3 percent of the total power generation in India. This would be raised to 10 percent by 2,000 A.D. viz nuclear power would account for 10,000 MW out of a total capacity of 1,000,000 MW by then. India would be importing pressurised water reactor from the USSR, whose design was the most popular, he said.

With the available uranium resources in the country, 10,000 to 15,000 MW could be generated in water-cooled reactors. The installation of fast breeder reactors, using plutonium and depleted uranium discharged from pressurised heavy water reactors, would generate 3,50,000 MW of electricity, which would meet the power requirements in the 21st century. The per capita energy consumption in India was one-tenth of the world average and if it were to be raised to the world average the country should produce 3,50,000 MW, he said.

Mr Sundaram said the Chernobyl accident on 26 April 1986 was caused by the operating crew, who were conducting unauthorised experiments in violation of safety norms. The efforts of Soviet authorities to bring the situation under control and transport the nearby population to safe areas were heroic. After the exaggerated alarm raised about the accident it was realised that the public had not been adequately educated.

Investment recovered: Mr V. Rangarajan, chief superintendent, MAPS, said the performance of the two units of MAPS were up to international standards. As on today, while the first unit had generated 5,000 MW of power, the second unit had produced 2,488 MW. The money invested on both the units—Rs 230 crores—had been recovered.

He pointed out that while it cost only 37 paise to produce one unit of power in MAPS, it cost 60 to 80 paise to produce one unit of thermal power.

Mr L. V. Krishnan, head, Safety Research and Analysis Division, IGCAR, said the fear about nuclear power or nuclear reactors centred on the radiation factor. But

radiation had been an inseparable part of the environment since the origin of the universe. The population's exposure to radiation from nuclear reactors was far less than the exposure to natural radiation.

But the public perception was different because of lack of education, Mr Krishnan said. Even though the Chernobyl reactor had a unique design and there was no problem whatsoever with it, the lesson learnt from the accident was that there should be specially trained dedicated operators to run the reactors.

Remote possibility: Mr N. Rajasabai, operation superintendent, MAPS, detailed the elaborate training that the operators in the reactors at Kalpakkam and Rajasthan underwent. They had to write regular examinations and were interviewed by special committees. They had to keep abreast of the latest developments in the field.

Mr Rajasabai said the Department of Atomic Energy had formed committees to review the designs of reactors and modifications that had been recommended were implemented. The chance of an accident from a pressurised heavy water reactor at Kalpakkam was remote.

Mr A. R. Sundararajan, head, Health and Safety Section, IGCAR, said the environmental radiation surveillance programme at Kalpakkam consisted of ambient radio activity survey, establishing levels of radio activity in samples, wholebody monitoring of MAPS personnel etc.

Mr A. V. Solodov, deputy director, Soviet Cultural Centre, Madras said the Chernobyl accident raised the question of safety of atomic power engineering. But the enquiry into the accident revealed that atomic power engineering was up to the mark and the accident was caused by operators' negligence.

/12232

Atomic Energy Official Holds News Conference

Says Pakistan Developing A-Bomb

BK2407030788 Delhi Domestic Service in English
0240 GMT 24 Jul 88

[Text] The Atomic Energy Commission chairman, Dr Srinivasan, has said Pakistan is acquiring various types of hardware from different parts of the world in its efforts to assemble an atomic bomb. He said India is committed to peaceful use of atomic energy. Addressing newsmen in Pune, Dr Srinivasan said the developments in the neighborhood would not drive the country toward a weapon-oriented nuclear program. However, he said, the country's interest will be fully safeguarded.

Heavy Water Plants Proposed

BK2307161688 Delhi Domestic Service in English
1530 GMT 23 Jul 88

[Text] Two more heavy water plants are coming up at (Manguru) in Andhra Pradesh and Hazira in Gujarat. This will be in addition to six heavy water plants in operation in the country already. This was disclosed by the Atomic Energy Commission [AEC] chairman, Dr Srinivasan, at a press conference in Pune today. Dr Srinivasan said heavy water was being imported from the Soviet Union for expansion of the Rajasthan Atomic Power Plant. He ruled out any plan to export heavy water in view of the country's requirements. The AEC chairman said talks were on with the Soviet Union for the import of two reactors.

2 'Giant' Reactors From USSR

BK2307144388 Hong Kong AFP in English
1434 GMT 23 Jul 88

[Text] New Delhi, July 23 (AFP)—India is to buy two giant nuclear reactors from the Soviet Union, the PRESS TRUST OF INDIA (PTI) reported Saturday.

PTI quoted Atomic Energy Commission (AEC) Chairman M. R. Srinivasan as saying that India was ready to sign an agreement for two 1,000-megawatt pressurised light-water nuclear reactors for purchase before the end of the year.

Mr Srinivasan said New Delhi was currently studying a draft agreement.

The two reactors would help boost India's total nuclear energy output to 10,000 megawatts by the year 2000, the AEC chairman said.

The offer is the first from the Soviet Union in the nuclear field since India set up its first nuclear plant in 1969 in western Maharashtra state.

Mr Srinivasan said the federal government had approved outlays of more than one billion dollars to the AEC to build six 500-megawatt nuclear reactors and four 235-megawatt reactors in India.

"We have reached a stage of standardised designs, and industries have become more experienced in meeting requirements of the construction of our (nuclear) reactors," Mr Srinivasan was quoted as saying in the western city of Pune.

Mr Srinivasan said the AEC had not finished selecting sites for the installation of the new reactors.

Analyst Advocates Indo-Pakistan Nuclear Arms Pact

51500201 Bombay THE TIMES OF INDIA in English
6 Jun 88 p 8

[Article by K. Subrahmanyam]

[Text] In an article published in this paper (5 April), I argued that there was no reason to exclude a possible transfer by China of CSS-2 missile technology to Pakistan and that the Chinese IRBM missiles (intermediate-range ballistic missiles) supplied to Saudi Arabia were in fact intended to be the carriers for Pakistani nuclear warheads. This has been followed by the NEW YORK TIMES report (25 May), quoting U.S. official and Pakistani sources to the effect that Pakistan had test-fired a missile capable of carrying a nuclear weapon.

As was only to be expected, the report has been denied by the Pentagon. But this would only show what while there are some individuals in the U.S. intelligence community who want the world to know the fact of the test, the U.S. Government in pursuit of its policy of having Pakistan as a cooperative ally, has decided to deny it.

Given that status of Pakistan's indigenous missile programme, this missile could have come only from China. Even as it test-fired the first missile, Pakistan according to the NEW YORK TIMES report, has components for 42 missiles. One hopes that at least after these reports there will be no puerile arguments in India about Pakistan's nuclear capability.

Pant's Remarks

The defence minister, Mr K. C. Pant, assured the Lok Sabha on 25 April (ironically on the very day Pakistan is reported to have conducted its missile test) that there was no "vulnerable window" in the country defence preparedness and the Indian forces would not find themselves at a disadvantage in the event of a nuclear attack from Pakistan. In plain language this would mean that India has a few bombs in the basement and Pakistan is not being left in any doubt about it.

The resulting situation is unprecedented. It would appear that very few people in India, Pakistan or the rest of the world understand the uniqueness of the Indo-Pakistan nuclear stand-off and the need to evolve rules of peaceful coexistence between the two nations, both of whom do not acknowledge in public their own respective nuclear capability.

So far in the rest of the world, five acknowledged nuclear-weapon powers have based their strategy of nuclear deterrence on openly declaring their capabilities. Israel practises ambiguity, but has the advantage of doing so against non-nuclear adversaries. The world has no parallel of two potentially hostile nations having nuclear capabilities, yet denying them and still hoping to deter each other with the strategy of ambiguity. While I

myself have been advocating the strategy of ambiguity for India, I believe that both India and Pakistan have arrived at a stage in their nuclear capabilities that special rules have to be devised if accidents and miscalculations are to be averted.

I have also been advocating a three-stage arms control process between India and Pakistan. (THE TIMES OF INDIA, 30 July 1985). The first step is for one to reassure the other that there will be no attack on its nuclear facilities. This step has been implemented in the verbal agreement between Prime Minister Rajiv Gandhi and General Zia-ul-Haq on 17 December 1985, though it is yet to be formalised as a written agreement.

The second step I propose is that India and Pakistan conclude an agreement whereby neither will use its nuclear capability against the other or any other member of SAARC. This will not just be a mutual no-first-use or no-use agreement in respect of nuclear weapons. It must cover the use of radioactive waste as radiological weapons in view of reports that large quantities of highly radioactive wastes have been transferred from certain western countries to others including Pakistan.

The third step is to bring about a treaty among the USSR, India, China and Pakistan, to begin with, on banning the use and threat of use of nuclear weapons. This principle has already figured in the Rajiv-Gorbachov declaration of November 1986. Both China and Pakistan have consistently voted along with India on this issue in the UN. Such an agreement, if entered into by these four states, may form the foundation for an alternative path to the non-proliferation treaty and more states may join it. In the UN more than 132 states (only 15 nations of the NATO and two of their allies are opposed to it) have subscribed to such a proposal.

In the case of all other nuclear weapon powers, the troops on the border have been given strict instructions not to engage in any activity that would escalate. In Europe where the deployment of nuclear weapons are the densest, the conference on security and cooperation has prescribed a number of confidence-building measures. There is considerable scope for India and Pakistan to engage in a dialogue on similar measures, which should include no exercises within certain distance from the border and the inviting of observers for exercises of certain dimensions. It is necessary to arrive at a freeze agreement on the present status quo on Siachen.

Dialogue Needed

Countries which are nuclear also make the common border nonporous, in order to ensure that the other party does not indulge in sabotage activities, in the confidence that the other side would hesitate to escalate the conflict. There were already a number of reasons why the India-Pakistan border should be sealed and an impervious security belt be created. The nuclear status of Pakistan is yet another reason why this should be undertaken.

An important compulsion on nuclear adversaries is that they should be in continuous communication and dialogue. Recently the United States and Russia have agreed to set up risk reduction centres. Perhaps that stage has not been reached in the subcontinent, but a continuous dialogue and communication must be kept, at the Foreign Office level and between the military forces.

Before these steps are initiated, India should declare unequivocally that it is its firm belief that Pakistan is a nuclear-weapons power and that the Indian security policy is being geared to take care of that situation. It is not necessary for India to declare its own nuclear status. It is possible that Pakistan will follow suit and say the same thing about India. This will help to clear a lot of misunderstanding, without either country having to admit its own nuclear status.

Pakistan may soon have to be ready to deal with an American president who is ethnically a Greek (all Muslim nations support the Turkish occupation of Cyprus) with a Jewish wife. Pakistan may also be compelled to move more of its troops to the Afghan border since Afghanistan without Soviet troops is likely to create more security problems for it, than when they are there. Pakistan has to watch Iran carefully. There have been serious Shia-Sunni clashes in Gilgit a few days ago and in the tribal territory last year and the Shias are receiving assistance (monetary and otherwise) from Iran. As the oil price continues to be static at a low level, Pakistan is unable to count on foreign aid on as generous a scale as it has so far been. Neither Mr Bush nor Mr Dukakis is likely to be as friendly to Pakistan as Mr Reagan and his staff have been.

Pakistan has been receiving Chinese technical assistance in bomb-making (the U.S. intelligence community has been saying it for years) and now it has obtained missiles from China along with Iran and Saudi Arabia, its own transactions hidden behind the smokescreen of other transactions. Pakistan realises that its own internal security problem, problems created by the Soviet withdrawal from Afghanistan and those likely to be generated by Shia Iran will compel it to reduce its troop deployment vis-a-vis India. What can be a less costly alternative than to resort to nuclear deterrence in respect of India and re-deploy its forces for other threats?

The present situation is therefore both a challenge and an opportunity for India. It should offer a package of measures to Pakistan and make relevant demands in return.

We recognise Pakistan as a nuclear-weapons power and do not leave any window of vulnerability for ourselves. We are prepared to proceed with the three-stage nuclear arms control agreement. We would agree to create a security belt on both sides of the border. The Pakistanis claim that they are worried about India infiltration in

Sind. We should agree on joint rules to prevent border crossing. This has already been initiated in the recent talks between the Indian and Pakistani Home secretaries.

Siachen Issue

We are prepared to work out a package of measures on confidence-building on military manoeuvres. We give full guarantees that Pakistan can re-deploy its forces to deal with the turbulence that is bound to follow the Soviet withdrawal from Afghanistan. There will be no concession on the Siachen issue.

India has to accelerate its space and missile development programmes. Those who are agitating against the Balasore missile range should realise how their stand is likely to affect adversely the security of the country. The Soviet Union should be persuaded that in the light of Chinese missile transfers to Saudi Arabia, Iran and Pakistan, it will be in its own interest to intensify cooperation with India in missile technology.

/12232

Rumors on Clandestine Receipt of Heavy Water Denied

Experts Quoted

51500197 Madras *THE HINDU* in English
28 May 88 p 10

[Text] New Delhi, 27 May—Experts here say that India could not have been the destination of heavy water diverted from other countries as the quantity involved was too meagre to serve any useful purpose.

India's requirement in 1983 revolved around 200 to 250 tonnes for commissioning the Madras Atomic Power Project-I, which is not under international safeguards, and it could have been met from indigenous production stockpiled over the years, they argue.

Besides, India receives regular supplies for all its reactors under international safeguards.

Two NEW YORK TIMES reports in quick succession this month, quoting some American experts, have speculated that the diverted water had been obtained by Pakistan or India. India has, however, denied obtaining covert shipments of heavy water diverted from West Germany and Romania.

Blackmarket

Earlier this month, Norway disclosed that 15 tonnes of heavy water intended for West Germany had been diverted in 1983 to the international blackmarket. The

25 May report, quoted Norwegian officials as saying they were investigating whether a shipment of heavy water sent to Romania 2 years ago had been improperly diverted.

The speculation on 25 May involved Israel too, though an expert discounted the possibility saying Tel Aviv was under no pressure to submit to global safeguards until early 1987.

Experts were also of the opinion that Pakistan could have received the diverted material as it had no heavy water production facility of its own and was totally dependent on outside sources.

"India has no visible need to turn to the international blackmarket for heavy water as it has several plants producing the substance indigenously," the experts asserted.

Asked to comment on reports in a section of the press that India's heavy water plants were not functioning up to the mark, the experts said "India could still be producing enough of the substance to meet its requirements as it has no problem of supplies for its reactors under international safeguards."

"The only nuclear reactors for which it has to depend on indigenous production of heavy water are the Madras Atomic Power Project (MAPP) and the Dhruva and there seems no reason why it should not be able to meet their requirements domestically."

Asked whether heavy water could have been diverted from other plants for commissioning MAPP-I, the experts ruled out the possibility altogether. "Such an action of diverting heavy water from a reactor under international safeguards to one not covered by safeguards would automatically bring the latter also under safeguards."

IAEA Inspection

For the same reason Soviet heavy water also could not have been used for commissioning MAPP-I, as it would have bought the facility under safeguards and opened it to inspection by the International Atomic Energy Agency authorities.

Some experts branded the whole exercise at giving India's nuclear programme a bad name or to equate it with the Pakistan nuclear programme.

"It appears to be a disinformation campaign to malign the Indian nuclear programme in view of allegations that Pakistan was clandestinely pursuing a nuclear weapons programme," the experts opined.

Even before the recent controversy surfaced, the authorities have often been asked from where heavy water was obtained for MAPP-I. The reply all along has been that

the requirement had been met from indigenous production and that enough stocks had been accumulated over the years preceding 1983 to fill the MAPP-I reactor.

The Department of Atomic Energy sources here reportedly dismissed reports of the diversion of heavy water to India as "politically motivated" and said the entire exercise was directed at "pressuring India against pursuing an independent nuclear energy programme."

Linking the allegations to India's refusal to put all its nuclear facilities under international safeguards, the DAE reportedly said the country's heavy water requirements were constantly reviewed, the needs on a long-term basis estimated in advance and met in time.

The Atomic Energy Commission Chairman, Dr M. R. Srinivasan, has also dismissed speculation that India had a "clandestine" nuclear programme. From the very beginning it had been India's intent to have a nuclear programme exclusively for energy needs, he said.

Despite India's refusal to permit inspection of all its facilities by outsiders, it had arranged for visitors to tour all its plants, he added.—UNI

AEC Chief's Press Conference

51500197 Madras *THE HINDU* in English
3 Jun 88 p 11

[Text] Karwar, 2 Jun—Dr M. R. Srinivasan, Chairman of Atomic Energy Commission, expressed the hope that the fourth super power summit would pave the way for an agreement on further reduction of strategic arms. He called upon other nations equipped with nuclear weapons to follow suit.

Addressing presspersons here on Tuesday he said India was self-sufficient as far as heavy water was concerned. As such there was no need to get it clandestinely from other countries as reported in sections of the western press. He alleged that some sections of the western media were always interested in involving India in one controversy or the other.

Questioned about the criticism of the Department of Atomic Energy in a report by the Comptroller and Auditor-General in regard to Tuticorin heavy water plant and Dhruva reactor, he said the production of heavy water involved an advanced and complicated technology. The delay and production shortfall at Tuticorin plant were due to certain problems which had been overcome.

Regarding Dhruva reactor he clarified that it was a research unit providing facilities for experiments. The unit which suffered certain vibration problem, had started working at its designed level from January last. Agreeing with the environmentalists' concern about nuclear waste, he said the waste coming out of reactors was of small quantity which could be contained through

encapsulation. These wastes could be kept away from the biosystem under close supervision neutralising potential danger. He assured that steps had been taken to possible disaster in any plant.

Precautions Taken

Dr Srinivasan claimed that nuclear reactors had been designed to withstand seismic factors. A certain amount of conservation had been provided for in the reactors located in seismic-prone areas like Narhara. Kaiga was seismically stable. Regarding uranium mining at Arabal site he said no decision had been taken to start production of uranium on a large scale. Areas like Koappa in Andhra Pradesh having large uranium deposits are likely to be explored. Many environmental groups, which visited different atomic plants to explore radioactive impact were not aware of the precautions taken by the AEC, he pointed out. Regarding environmental safety he said regular monitoring had shown that there was no significant increase in radiation. "We would try to maintain greenery around the plant through extensive planting."

Dr Srinivasan expressed the hope that the Kaiga project would be completed by 1995. Younger members of displaced families would be trained for employment in the project.

There has been a steady growth from experimental stage to production of electricity from nuclear reactors. The Nuclear Power Corporation had already reached the target of Rs 100 crores through issue of bonds. He promised to set up an information centre here and hold exhibitions on atomic plants.

/9604

Experts Discuss Problems in Heavy Water Plants 51500198 New Delhi PATRIOT in English 8 Jun 88 p 5

[Text] Adoption of "underdeveloped" foreign technology is the bane of India's heavy water plants, says UNI quoting nuclear experts stationed in New Delhi.

According to them, in the early sixties when India was looking for heavy water technology only four countries—Norway, Canada, the United States and the Soviet Union—had fully developed it.

"But these four were not ready to lend India the expertise forcing it to look for it elsewhere," the experts say.

In these circumstances India had to go in for French and West German technology for setting up its heavy water plants.

"But France and West Germany were then in a nascent stage of developing this technology. India with no other option in sight had to go in for it."

Another reason attributed by experts for the poor functioning of Indian heavy water units is the "unsatisfactory" functioning of some fertiliser plants.

"By-products from some of these were vital to the smooth functioning of the heavy water plants, but most of them did not function properly affecting the production of heavy water in the process."

According to the experts, these were the two main factors responsible for upsetting India's heavy water production programme.

Quashing allegations that France and West Germany took India for a ride, the experts say "it is a classic example of a positive step taken with the best of intentions having boomeranged."

"It was the best possible option in the given set of circumstances and could have worked wonders if everything had gone as expected," they claim.

"Our own scientists have perfected the heavy water production technology over a period of time and as plants with major indigenous component go on stream the problem will be solved," the experts say.

Two new heavy water plants with maximum indigenous component are coming up at Manuguru and Hazira and more are to be constructed in the near future.

The indigenous heavy water plants will have an annual production capacity of 150 to 200 tonnes.

It is envisaged that India would achieve an installed heavy water capacity of 13,000 tonnes by the turn of the century.

Recently, there have been a spate of reports that India's heavy water plants have not been functioning at more than 30 percent of their capacity for the past several years.

Heavy water and its production form an essential component of India's nuclear programme and for achieving nuclear power target of 10,000 MW by the turn of the century.

Most of India's nuclear reactors are based on the Canadian model which uses natural uranium and for which heavy water is essential. This model was opted for as India has natural uranium in abundance.

The quantum of India's annual production of heavy water has never been revealed.

Officials have, however, all along maintained that India was producing enough of it to meet its needs.

Heavy water has no direct use in making nuclear weapons. It is used as a moderator in nuclear reactors fuelled by natural uranium.

The proportion of heavy water is only a few parts in a million in ordinary water and is obtained through a difficult process of chemical engineering. It can be used over and over again after undergoing a process called "fractional distillation."

India, at present, has six heavy water plants. They are the Nangal plant with a capacity of 40 tonnes, Kota with 100 tonnes, Talcher 62 tonnes, Tuticorin 80 tonnes, Baroda 100 tonnes and Thal 110 tonnes.

The Baroda plant is currently said to be inoperational following an accident a few months ago. The Talcher plant also remained shut down for some time last year.

The Nangal plant is reportedly functioning satisfactorily but is frequently plagued by load-shedding.

According to the latest report of the comptroller and auditor general (CAG), the Tuticorin heavy water plant worked at one-fifth of its installed capacity from July 1978 to March 1986.

The CAG also observed that the construction of the Dhruva reactor at Trombay has been unduly delayed.

According to estimates, the production of 1 kg of heavy water costs about Rs 6,500.

/12232

Review Panel Proclaims Tarapur Nuclear Plant Safe

51500208 Bombay *THE TIMES OF INDIA in English*
24 Jun 88 p 19

[Text] New Delhi, June 23 (PTI)—A committee set up to review the safety of the Tarapur atomic plant has found the state of health of the plant "adequate to permit continued operation."

Since 1977, there has been a continuous improvement in the control over radiation exposures at the station, and the release of radioactive effluents to the environment have been kept well below authorised limits, according to the report submitted to the atomic energy regulatory board (AERB).

The committee headed by Prof K. Sri Ram of the Indian Institute of Technology, Kanpur, has however called for further improvement of safety measures, including stricter enforcement of quality assurance, elimination of deviations from technical specifications and retraining of plant personnel.

The department of atomic energy (DAE) said the review of Tarapur plant "can be considered as the first such study of an operational nuclear power plant by AERB."

Two other committees set up to review the safety of pressurised heavy water reactors (PHWR) and the quality of equipment supplied by contractors have also submitted their findings to AERB, DAE said.

The committee on PHWR, headed by Dr P. Rama Rao, a defence scientist, has blamed the unusual occurrences and outages of Rajasthan atomic power station (RAPS) on the "unreliability" of indigenous components.

Its report said "indigenisation effort put in by the station had resulted in greater unreliability and taken its toll by way of outages."

Rao committee has called for adequate endurance tests to ensure reliability "before deciding to use indigenous components or equipment."

Other recommendations of the committee relate to design improvements, selection of proper materials, components and equipment, and adequate stocking of spares. "It must be ensured that written authorised procedures are followed for all important operation and maintenance activities."

The third committee, which reviewed the quality control and inspection programmes of the manufacturers of critical components, has given specific recommendations for upgrading the quality control programmes of different manufacturers.

The committee, under the chairmanship of Prof B. S. Magal of IIT Bombay, also suggested that the Nuclear Power Corporation (NPC) should carry out periodic quality assurance (QA) audits at the manufacturers' works and promote QA culture by organising workshops.

The aspects reviewed covered formulation of QA documents, management review of QA programmes, document preparation and release control, calibration of measuring and test equipment, internal and external audits, and record keeping.

/6091

Auditor Notes Faults in Heavy Water Unit Planning

51500206 New Delhi *PATRIOT in English*
28 Jun 88 p 9

[Text] Even after eight years of being commissioned the Tuticorin heavy water plant (THWP) has achieved an average annual production of only 20.6 per cent resulting in a shortfall in production of Rs 186.67 crore, reports UNI.

The low production levels pushed up the cost of heavy water from Rs 4,120 a kg to Rs 13,800 a kg.

Increased capital deployment and increased consumption of utilities and spares also added to the high cost of heavy water production, the Comptroller and Auditor General of India (CAG) said in its latest report.

The CAG criticised the decision to contemporaneously set up two heavy water plants at Baroda and Tuticorin, based on a new French technology. Even the French pilot plant had been in operation for only two years.

Technical collaboration agreement was entered into with Gelpira, a French consortium, in 1971 for a turn-key project, THWP, to be commissioned by January, 1975. But the plant was commissioned in 1978 more than 42 months behind schedule. However, Gelpira was absolved of all their contractual obligations, guarantees and warranties through an amending agreement in 1978 because the plant could not be run and tested on sustained basis due to power shut-down.

The THWP did not reach the level of production indicated in the technical agreement and even the consumption of utilities and spares was higher than anticipated. Thus, the technology transfer was incomplete at the time of the termination of the contract and the foreign collaborator had to be absolved of his contractual obligations, the CAG said.

The Department of Atomic Energy (DAE) attributed the 42-month delay in commissioning of the plant to the delay in acquisition of land, completion of structural work, supply of equipment and increased import.

The initial financial sanction for the THWP was 20.27 crore but it went up to Rs 48.93 crore on completion.

The Baroda heavy water plant, also set up with Gelpira collaboration, faced problems right from start the report pointed out. There were also delays in the supply of fabricated equipment, design defects, leakages, failure of pumps, explosion and cracking of equipment.

The THWP operated only for 1,284 days during the last eight and a half years as against 2,250 available days.

The plant, commissioned in July 1978, has not been declared commercial so far and no proforma accounts have been prepared, the CAG pointed out.

Regarding the deployment of personnel, the CAG recalled that only 35 people, exclusive of maintenance staff, were required to run the plant according to the original agreement with Gelpira. However, the DAE assessed the requirement to be 350 people. The men in position after the plant became operational were 373 in 1978-79 and 457 in 1985-86.

As per the DAE's latest assessment the requirement is 523, the CAG pointed out.

According to an agreement, the Southern Petrochemical Industries Corporation (SPIC) had to pay the THWP Rs 80.22 lakh a year for the first 10 years from the date their ammonia plant went into commercial operation to liquidate the financial assistance given to them.

The SPIC rejected the THWP's claim for interest on belated repayments on the ground that the agreement did not provide for it. It resulted in a loss of Rs 8.65 lakh up to March, 1985.

/6091

IRAN

Iran Denies Signing Nuclear Pact With Pakistan
51004727a Tehran KAYHAN INTERNATIONAL in
English 14 Jun 88 p 2

[Text] Tehran, 13 June (IRNA)—An informed source at Iran's Atomic Energy Organization Monday categorically denied a British newspaper report that Iran and Pakistan had signed a nuclear pact.

Speaking to IRNA, the source who asked not be named, described the report published in Sunday's issue of the OBSERVER as a "mere fabrication."

/12232

Iran, Hungary To Cooperate in Nuclear-Energy Projects
51004728 Tehran KAYHAN INTERNATIONAL in
English 15 Jun 88 p 6

[Text] Tehran, June 14 (IRNA)—Hungarian Industries Minister Frigyes Berecz currently in Iran to attend the fourth session of joint economic commission met deputy prime minister and head of Iran's Atomic Energy Organization, Reza Amrollahi Monday.

Issues of mutual interest in peaceful use of nuclear energy, especially nuclear medicine and agriculture, were discussed in the meeting. Members of the Hungarian delegation as well as Hungarian charge d'affaires to Tehran attended the meeting.

The Hungarian minister expressed hope the meeting would serve to expand Tehran-Budapest cooperation for peace.

At the end of the meeting the two sides agreed to nominate members of a joint task force for identifying the areas of joint cooperation for peaceful use of nuclear energy.

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Radiation Device Invented

51004727b Tehran KAYHAN INTERNATIONAL in
English 16 Jun 88 p 6

[Text] Tehran, 15 June (KAYHAN INT'L)—Iran's Atomic Energy Institute (IAEI) recently succeeded in manufacturing a device, which detects the existence of radiation in the environment by constant alarm sound.

Dr Ali Sohrabi, the director of the Protection Department of IAEI told the Central News Bureau (CNB) that the device would be used in agricultural industry, training and research centers as well as by those who were in danger of radioactivity.

/12232

FRANCE

Reactors Subject to Problems From Steam Generators

51002451 Paris LE MONDE in French 6 Jul 88 p 17

[Article by Jean-Francois Augereau]

[Text] Some French power plants are sick. The diagnosis has been made; the suspects are being monitored.

The first twenty 900-megawatt reactors built in France suffer from "steam generator troubles." The disease is not deadly. But it is inconvenient because, in addition to a temporary shutdown of the facilities, it may eventually require the replacement of some very expensive components, the steam generators.

The first symptoms are usually leaks of a few tens of liters per hour which bring into contact the slightly radioactive water of the primary coolant circuit of the reactor core, and the water of the secondary coolant circuit which turns into steam and powers the alternator turbines. If these leaks, which occur in high-stress areas (stress corrosion), are not repaired in time, excessive fatigue of the metal tubing in which the primary water circulates may occur. The tubing can then break suddenly, leading to what is called "a steam generator tubing failure" by experts and seen as a relatively serious occurrence by safety organizations.

Therefore, power plant operators, in particular EDF [French Electricity Company], pay special attention to these leaks. In this respect, the policy of EDF and the French safety authorities is that leaks must not exceed 72 liters per hour. Actually, however, power plants are shut down as soon as leaks amount to 10-20 liters per hour. Technicians then plug up the failing tube. This is not an easy task considering that these steam generators, nearly 20 m high, contain 80 km of U-shaped tubes.

Continuous Detection

Up to 15 percent of the tubes can be plugged up without affecting the heat exchange capacity of the facility. After that, the steam generator must be replaced, at a cost to EDF of about Fr330 million per reactor.¹ The Dampierre-1 reactor should require such an operation in the next 3-5 years. Other reactors are being monitored; for instance, Bugey-5 and the four Tricastin reactors. Certainly, they have not yet reached the point where it is imperative to replace the steam generators. But the weakness of some steam generator components has become apparent already on several occasions.

Reactor No 4 at the Tricastin nuclear power plant had to be shut down twice, first on 8 June, and a second time during the night of 23-24 June. The cause of these two shutdowns was a leaking tube in one of the reactor steam generators. A total of twenty 900-megawatt reactors might be affected by this problem. These are the first

reactors of the French nuclear power-plant program; the reactors that followed might hold until the end of their service life (about 40 years), provided a special treatment (sheathing and microsphere shot peening) is applied to their steam-generator tubing.

"We cannot rule out the possibility of a failure," Mr Lucien Bertron, head of thermal power-plant production at EDF, estimated. To date, there have been nine steam-generator tubing failures in the world. The last one occurred on 15 July 1987 at the North-Anna nuclear power plant in the United States. Fortunately, the failure was brought under control in a little over 30 minutes, and the reactor returned to normal safe conditions.

Could this accident have been prevented? Probably, if the leak in the steam generator had been identified in time, as was shown by subsequent analyses. This is why EDF has decided to enhance its monitoring system. It decided to add instruments which will operate continuously and, if there is a leak, will detect in the secondary circuit the presence of a short-lived radioelement—nitrogen 16—which is normally present in the primary circuit. By the end of 1988, all 900-megawatt reactors should be equipped with this monitoring system, which the Americans might buy from Merlin-Gerin.

According to Mr Lucien Bertron, that is not enough. The personnel must be fully prepared to respond to such situations. This is why, early in 1987, EDF decided to start building a brand new simulator that would enable the operating personnel to familiarize itself with steam-generator tubing failures. This tool, the only one of its kind in the world, was designed in close cooperation with Frametec and Thomson-CSF; it uses an expert system which manages some 2,000 rules and can consider 120 different situations.

Together with the simulator, the SEPIA expert system (artificial intelligence teaching system) will fulfill three functions: it will analyze and comment a posteriori on the operator's response when confronted with a steam-generator tubing failure; it will explain certain episodes of the accident; and finally it will act as a teacher to help the student gain a better understanding of some of the physical phenomena he is or will be facing. The prototype of this new Fr10-million teaching tool should soon be installed at the Tricastin power plant. After it has been tested by the Tricastin operating teams, some 20 simulators of this type (Fr700,000 each) should be installed at the 900-megawatt reactor sites early in 1989, and late in 1989 at the 1,300-megawatt reactor sites.

Footnote

1. Plus an additional Fr170 million in various studies and tools, to be allocated over the whole replacement program.

Defective Spindles Need Replacing in Several Reactors

51002450 Paris LE FIGARO in French 2 Jun 88 p 20

[Article by Edouard Thevenon]

[Text] Sorrente—Over the next few months, the EDF [French Electric Power Company] will have to replace the "spindles" that are rusting and cracking in the reactor vessels of at least eight of its power plants. So the problem, which technicians thought they had solved, has not yet been overcome. And the breakdown deserves to be handled with all the more care in that it affects the reactors' safety components.

The notorious spindles—there are 122 in each reactor—are parts used in the reactor vessels to control the tubes in which the control rods slide. Control rods are what might be called the reactor's brakes, since they are "dropped" in order to shut down the power plant.

About 8 years ago, those spindles showed signs of failure in the first generation's 24 900-megawatt generating units. The phenomenon was not limited to France. Repairs turned out to be lengthy and expensive. It was necessary to build a special repair shop in Pierrelatte. Between 1982 and 1985, all the spindles in the 24 generating units concerned were modified and replaced.

But the problem remains unsolved. At the Gravelines-1 power plant (where repairs had already been made), it was discovered last February that a bolt from one of those notorious spindles had migrated to a steam generator, where it had caused damage described as "serious but repairable." Repairs were again made, and the reactor was restarted. But not for long. Two weeks ago, monitoring systems detected the fresh arrival in the steam generator of a second bolt. And Gravelines-1 has been shut down again.

No Safety Risk

Inspections to date have indicated that 50 percent of the spindles at Gravelines and 25 percent of those at Tricastin are probably cracked. "We thought we had come up with spindles that would last 100,000 hours, but they are lasting only 30,000 hours, like the others," says Remy Carle, assistant managing director of the EDF. But

the experts have made progress over the past few days. They think they have discovered the reasons for the weakness of the alloy, and only one type of fabrication is concerned.

But this episode obviously raises serious questions from the standpoint of safety. The problem has been examined and reexamined. "There is no safety risk," says Bernard Meclot, head of the EDF's Operating Department. "Cracked spindles cannot undermine the basic safety functions, which are control of the chain reaction, heat evacuation, and the confinement of radioactive products."

Is there a danger that the pipes in the steam generators will crack and allow irradiated water from the primary circuit to enter the secondary circuit? Meclot does not think so. Besides, he says, "a broken tube in a steam generator is an indexed incident that we know how to handle."

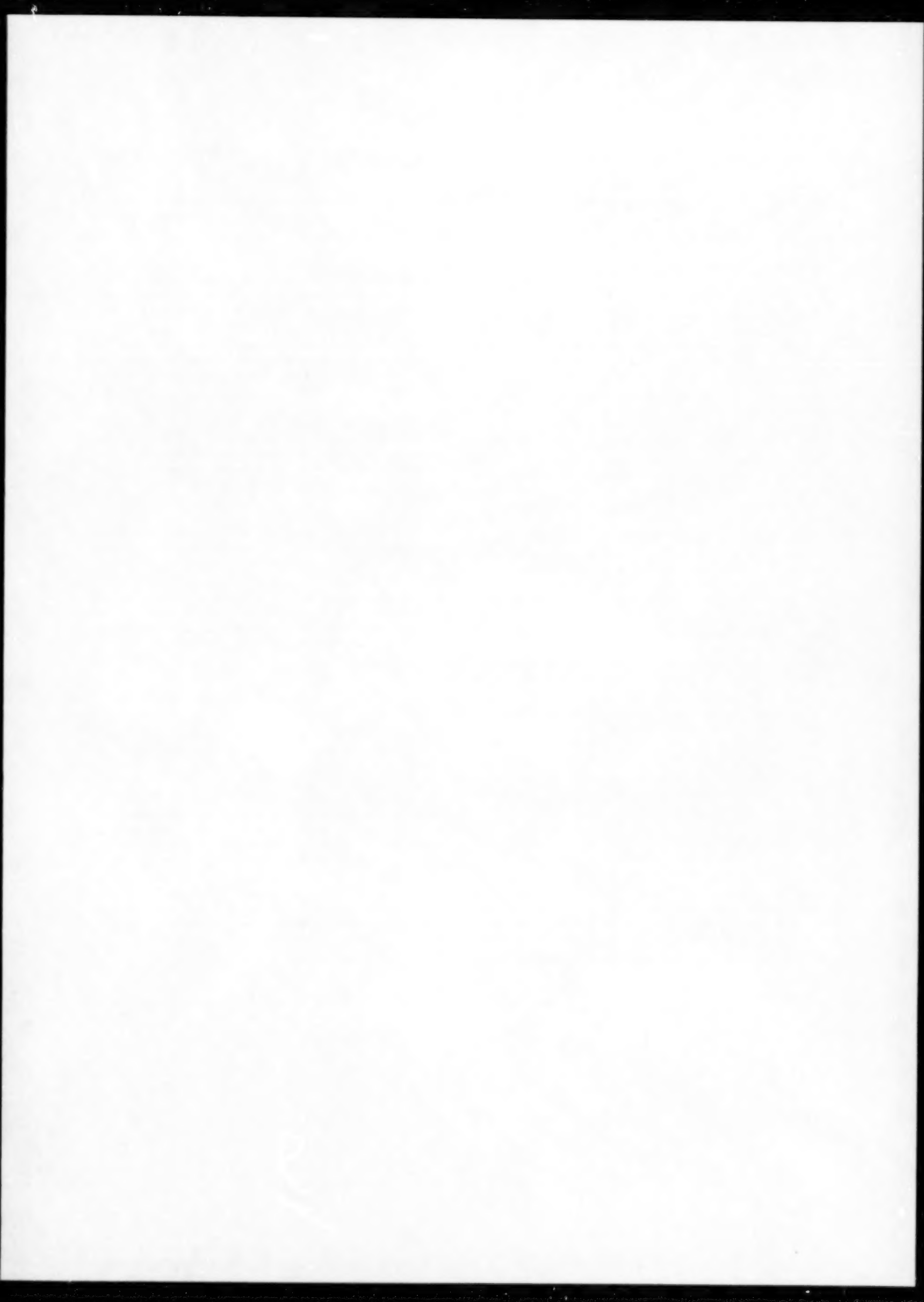
And in the core itself, is it not possible that those disappearing spindles could prevent the control rods from operating? "At no time has there been any movement by the bottom part of the guide tubes," says Meclot. "They stay in place. There is no danger that the sliding motion of the control rods will be blocked." Let us take note of that, while hoping that the indispensable repairs will be completed as soon as possible.

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TURKEY

Talks With USSR on Nuclear Accident Warning
TA2707175388 Ankara Domestic Service in Turkish
1600 GMT 27 Jul 88

[Text] Turkey and the Soviet Union have started talks in Moscow on the issue of early warning in case of a nuclear accident and on exchange of information on nuclear installations. The Turkish delegation at the talks, composed of officials from the Atomic Energy Institution, is being headed by Erdinc Ustun, the deputy director general of the Foreign Ministry Bilateral Economic Affairs Department. The talks will last until 30 July when an agreement will be signed to issue a warning in case of a nuclear accident and to exchange information on nuclear installations.



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